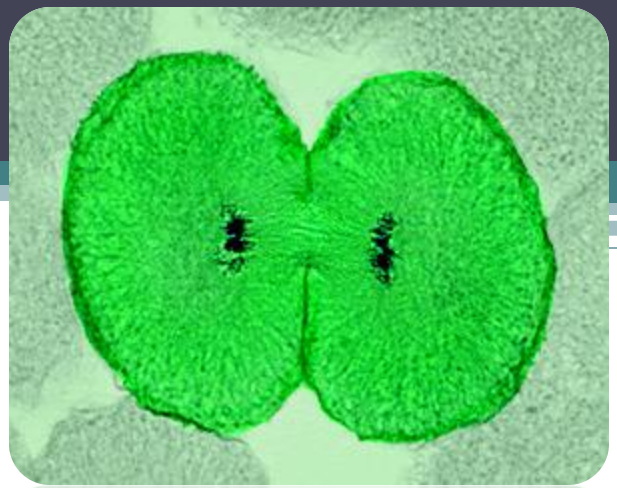
# Meiosis : Origin and Molecular Events during Meiosis



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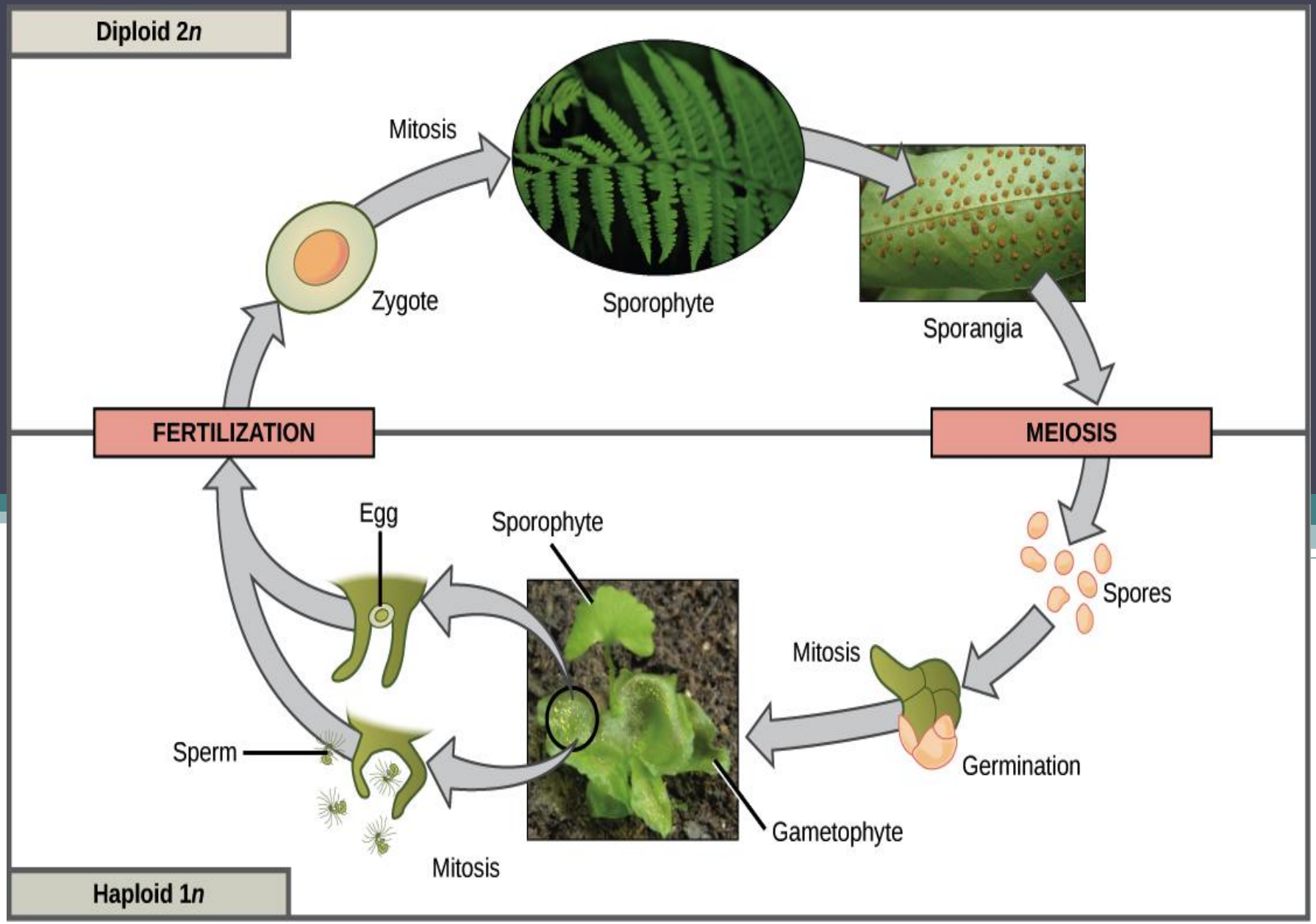
# Introduction:

- Cell division is a process by which the cell duplicates itself either for growth and repair or for reproduction of organism.
- The sexual cycle of a diploid organism involves the alternation of haploid and diploid states.
- The meiosis is a process of cell division by which the chromosomes are reduced from the diploid to the haploid number. Haploid sex cells are produced from the diploid cells in meiosis.

# Story Time

Van Benedin, while working on the horse thread-worm (*Parascarisequorum*), observed in 1883 that there were twice as many chromosomes visible during mitosis in the fertilized egg as there had been in the sperm and egg nuclei before the mitosis.

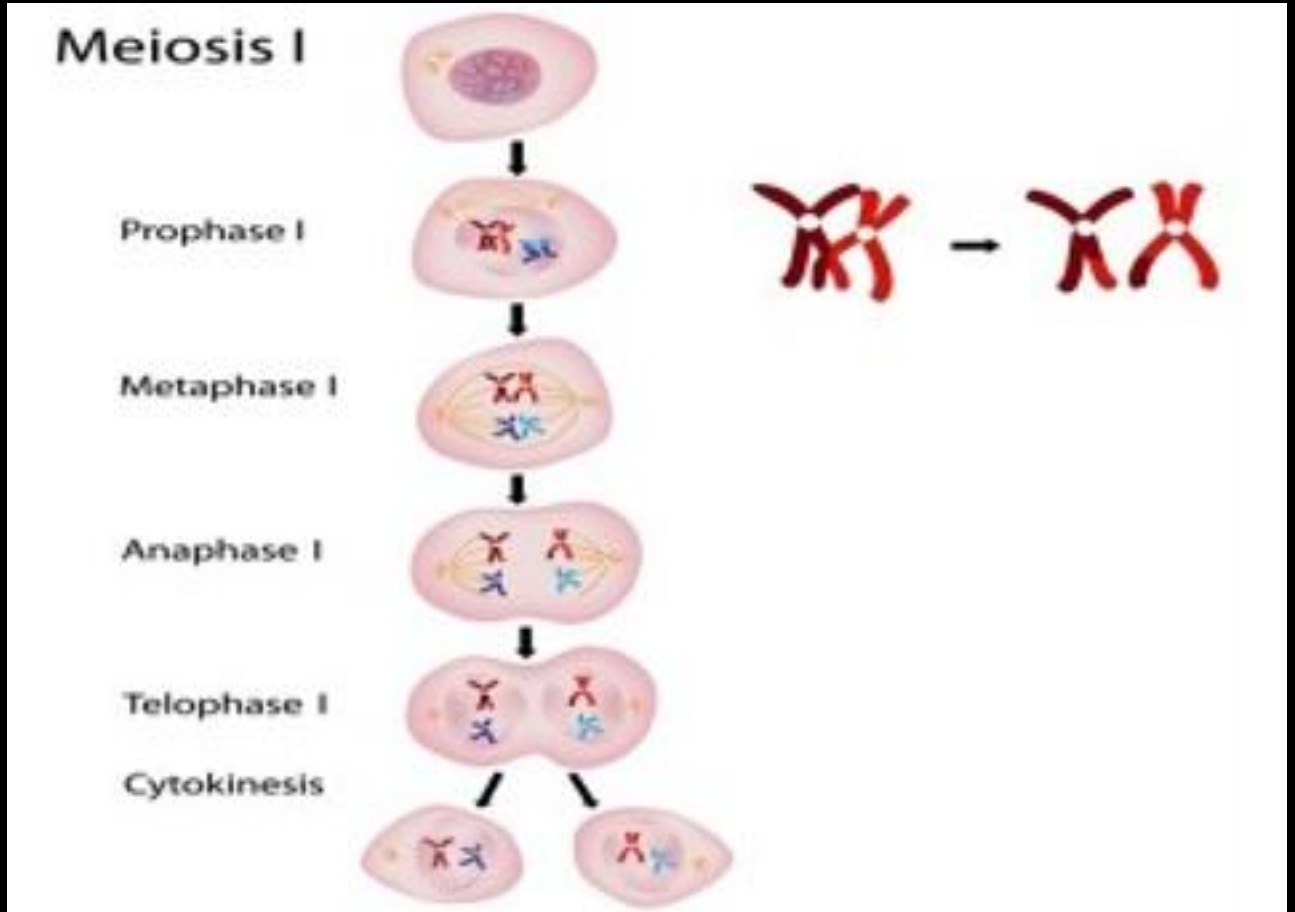
By this observation, Van Benedin concluded that the contribution of each of the female and male gametes was half the chromosome number to the zygote Weismann suggested in 1887 that in each generation there must occur reduction division at some stage in which the chromosome number is reduced to half Flemming (1887) and Strasburger (1888) observed that two nuclear divisions take place in rapid succession just prior to the formation of mature eggs and sperms in animals and formation of pollen grains in angiosperms. The entire process of reduction division leading to the formation of gametes was termed as “meiosis” in 1905.


Diploid 2n
Mitosis
Zygote
Sporophyte
Sporangia
FERTILIZATION
MEIOSIS
Egg
Sporophyte
Spores
Mitosis
Sperm
Germination
Gametophyte
Mitosis
Haploid 1n

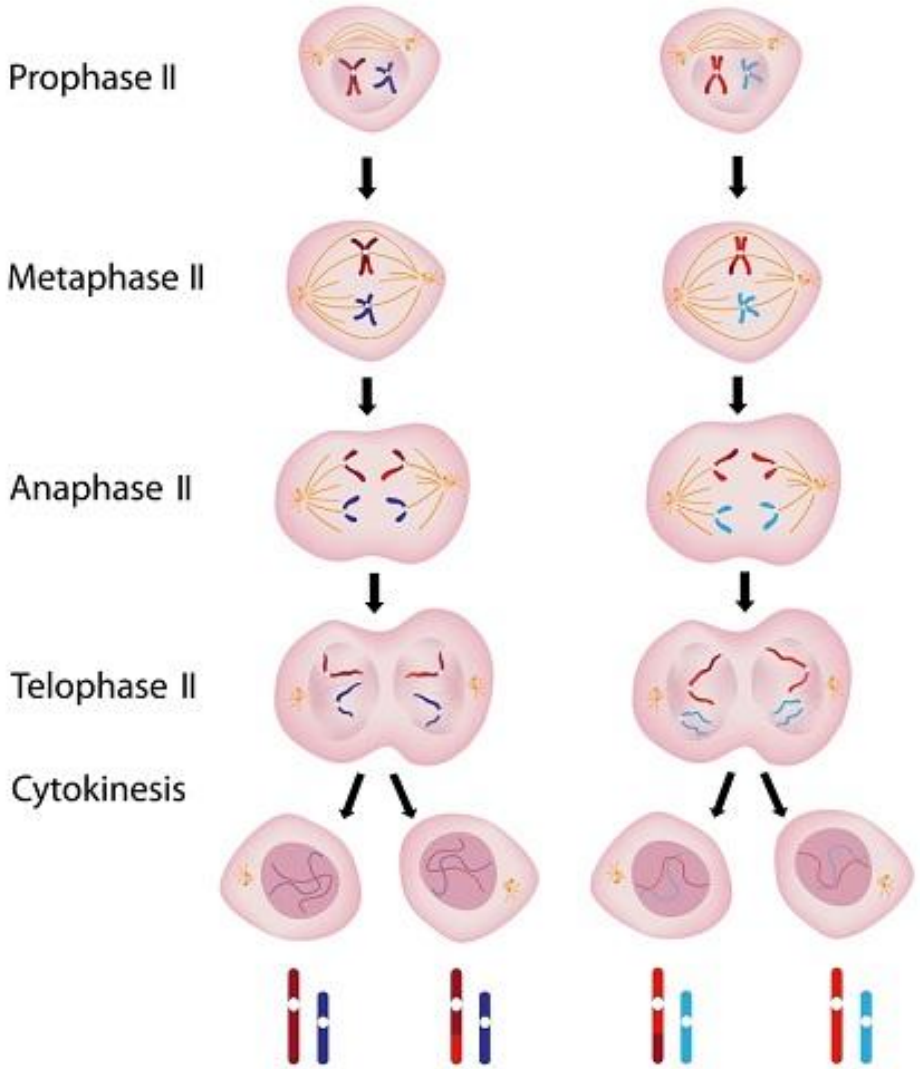
- During meiosis, homologous chromosomes pair, replicate once and undergo assortment so that each of the four meiotic products receives one representative of each chromosome.

- The two nuclear divisions are called first (meiosis- I) and second meiotic division (meiosis- II).

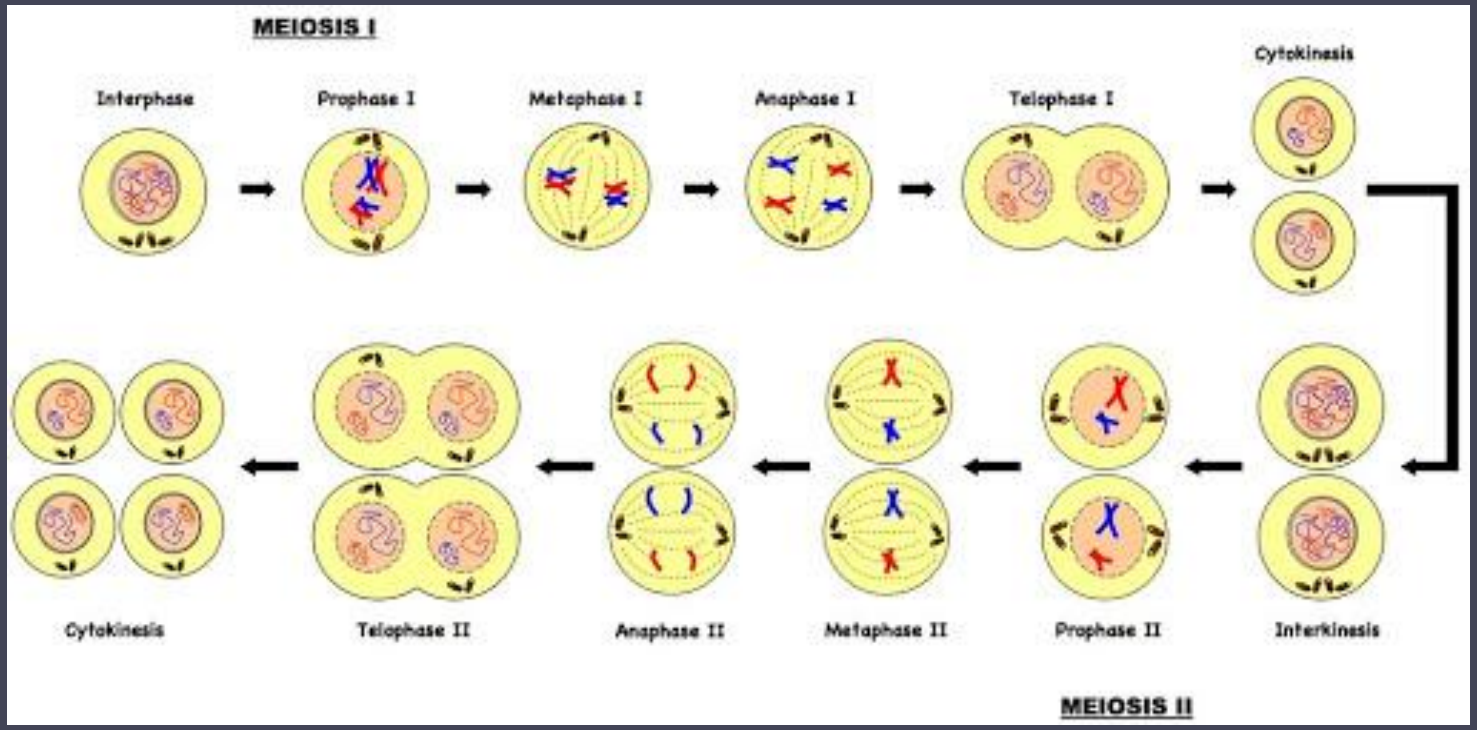
- Meiosis division I is divisible into four major stages (Prophase I, metaphase I, anaphase I and telophase I)


Meiosis I
Prophase I
Metaphase I
Anaphase I
Telophase I
Cytokinesis

# Meiosis II



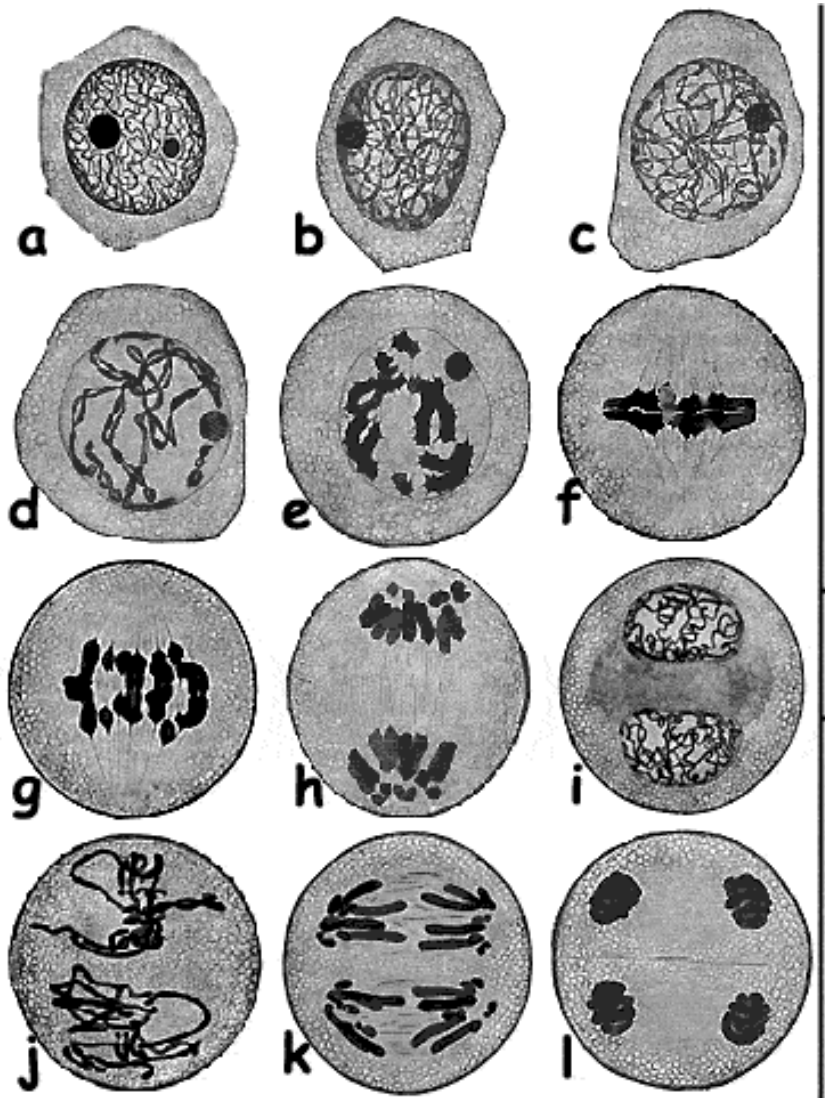

**Four different phases which constitute meiosis division II are prophase II, metaphase II, anaphase II and telophase II**




Meiosis may be defined as a special kind of cell division where the nucleus divides two times successively, while there is only one round of replication as well as division of chromosomes; this results in four haploid nuclei from a single diploid parent nucleus.

The first division of meiosis is called heterotypic or reductional division since there is separation of homologous segments of non-sister chromatids; this is commonly denoted as meiosis I.

The second division is similar to mitosis, and is called hoinotypic or equational division as there is separation of homologous segments of sister chromatids; it is generally referred to as meiosis II. In absence of crossing over, the first meiotic division is reductional, while the second division is equational.




**MEIOSIS I**

**Prophase I:**

- a Leptotene
- b Zygotene
- c Pachytene
- d Diplotene
- e Diakinese

**f Metaphase I**

**g Anaphase I**

**h Telophase I**

**i INTERKINESIS**

**MEIOSIS II**

**j Metaphase II**

**k Anaphase II**

**l Meiocytes (4)**

Source: Schaffstein in Strasburg
www-vcbio.sci.kun.nl

# Ask questions. Be curious.

# Thank You!